Canada-Nunavut Agreement

on the Transfer of Federal Gas Tax Revenues

under the New Deal for Cities and Communities 2005 – 2015

Nunavut Outcomes Report

30th September, 2009

Nunavut

Government of Canada

Contents

	Page
Executive Summary	iii
1. Introduction	
1.1 Gas Tax Funds	1
1.2 Public Transit Funds	2
2. Outcomes Report: Gas Tax Projects	3
2.1 Hall Beach Sewage Lagoon Decommissioning	3
2.2 Coral Harbour Sewage Lagoon/Wetland	4
2.3 Arctic Bay Power Supply	4
2.4 Kimmirut Power Supply	5
2.5 City of Iqaluit: Sewage Lift Station	5
2.6 City of Iqaluit: Sludge Management Project	6
3. Outcomes Report: Public Transit Projects	
3.1 Runway Stabilization Projects	8
Conclusions	9

Executive Summary

Introduced in 2005 by the Federal Government, the Gas Tax Fund (GTF) and Public Transit Fund (PTF) were designed to provide reliable, multi-year funding for communities to undertake infrastructure initiatives to help produce the shared national outcomes of cleaner air, cleaner water and reduced green house gas (GHG) emissions. The scope of GTF funding is aligned with the infrastructure needs of Nunavut, and this funding has been targeted specifically towards projects emphasizing improvements to water, wastewater and solid waste.

With the additional provisions announced in the 2008 Gas Tax Extension Agreement, Nunavut's total contribution of Gas Tax funds is $97.5 M, until the end of the Agreement in 2015. Since the inception of GTF, Nunavut has initiated over 30 infrastructure projects. As of September 30th, 2009, 6 GTF projects have been completed – four directly administered by the Government of Nunavut (GN), and two administered by the City of Iqaluit.

The PTF Agreement has allocated $370,621 of per-capita Federal funding to Nunavut for improvements to public transit infrastructure. To promote outcomes of cleaner air, PTF funds have been used for runway stabilization projects in four communities, helping reduce the amount of air particulates (dust) generated during airplane movements. Three of these projects have now been completed.

The outcome of the completed projects demonstrates Nunavut's commitment to fulfilling the objectives of the Gas Tax and Public Transit Funds. With more than 30 projects initiated to-date, and more projects planned in the coming fiscal years, GTF provides Nunavut with the reliable infrastructure funding needed for sustainable community growth.

1. Introduction

1.1 Gas Tax Funds

On August 3, 2005, the Government of Nunavut (GN) and the Government of Canada entered into an Agreement for the transfer of $37.5 M as part of the Canada-Nunavut Agreement on the transfer of Federal Gas Tax Revenues 2005-2015 (Table 1). In the 2007 Federal Budget, Gas Tax Funding (GTF) was extended with the provision of an additional $60 M to Nunavut (Table 2), bringing the total portion of GTF funding for the Territory to $97.5 M through 2013-14.

Table 1

Gas Tax Contribution Agreement (2005-2015)

Fiscal year	Canada's Contribution
2005-2006	$4.5 M
2006-2007	$4.5 M
2007-2008	$6 M
2008-2009	$7.5 M
2009-2010	$15 M
Total	$37.5 M

Table 2

Gas Tax Extension Agreement (2005 – 2015)

Fiscal year	Canada's Contribution
2010-2011	$15 M
2011-2012	$15 M
2012-2013	$15 M
2013-2014	$15 M
Total	$60 M

Gas Tax funds in Nunavut have been specifically targeted towards projects which emphasize improvements to water, wastewater and solid waste. Figure 1 shows the approximate distribution of projects that have been undertaken by Nunavut in each eligible category. These are critical infrastructure needs in Nunavut and are essential to future sustainable community growth.

The scope of GTF funding is aligned with the infrastructure needs of Nunavut, helping to address the aging infrastructure, community expansion, and future economic development within the Territory. GTF enables the communities in Nunavut to make investments in infrastructure projects that address local needs and help produce the shared national outcomes for environmentally sustainable and productive communities.

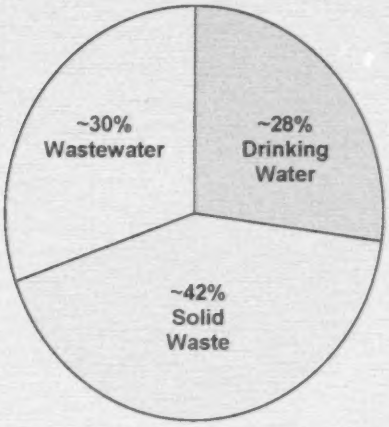

Figure 1: Approximate distribution of Gas Tax projects in Nunavut as of September 30, 2009 under the eligible categories of drinking water, wastewater and solid waste infrastructure.

1.2 Public Transit Funds

The Public Transit Fund (PTF) was designed and introduced by the Federal Government to address specific needs for improved public transit services across Canada. Funding was issued as a one-time contribution to each Province and Territory based on a per-capita funding formula. On December 1st, 2006, the Government of Nunavut signed the PTF Agreement transferring a total of $370,621 towards improving public transit in Nunavut.

The territory of Nunavut, although comprising approximately one fifth the land mass of Canada, contains less than 0.1 percent of the national population. Unlike our Provincial counterparts in the South, large urban centers, that necessitate the need for public transit such as buses and subways, are not found in Nunavut. In fact, the majority of the communities in Nunavut have populations less than 1,000 people. These communities are often quite remote, separated by vast distances and frequently lack basic road paving.

Given the small size and remoteness of communities in Nunavut, the primary mode of "public" transit is by air. Not only are airplanes relied upon heavily to transport people in and out of the communities, air transport is the most reliable and most utilized method of delivery for food and supplies, and is the sole means of delivery during the winter months. With such an emphasis on air transportation in Nunavut, improvements to airport infrastructure was identified as the main focus to utilize Public Transit Funds.

2. Outcomes Report: Gas Tax Funds

As the primary Eligible Recipient of Gas Tax funds, the Government of Nunavut, through the Department of Community and Government Services (CGS) administers all infrastructure projects on behalf of the municipalities in Nunavut. These funds are allocated to eligible community projects which are then implemented directly by the GN. Under the Gas Tax Agreement, the City of Iqaluit, a tax-based municipality, is the only other Eligible Recipient. A Funding Agreement with the GN is in place that transfers Gas Tax funds directly to the City of Iqaluit, which in turn, allocates these funds and administers eligible community projects in their municipality.

Since signing the Agreement in 2005, the GN has initiated more than thirty (30) infrastructure projects throughout the communities of Nunavut, with an additional two (2) projects undertaken by the City of Iqaluit. As of September 30th, 2009, six (6) Gas Tax projects have been completed – four directly administered by the GN and two by the City of Iqaluit (Table 3).

Table 3. Completed GTF projects as of September 30, 2009

GN - GTF Projects	City of Iqaluit - GTF Projects
Hall Beach Sewage Lagoon Decommissioning	Sludge Management Project
Coral Harbour Sewage Lagoon/Wetland Treatment System	Upgrades to Sewage Lift Station #1
Arctic Bay power supply upgrade to water pump house	
Kimmirut power supply upgrade to water pump house	

The following sections provide more detailed descriptions and performance indicators for the completed GTF projects listed in Table 3.

2.1 Hall Beach Sewage Lagoon Decommissioning

With a new sewage lagoon operational in Hall Beach, the old sewage lagoon had to be decommissioned to meet environmental regulations and obligations of the water license. Prior to decommissioning, the old lagoon had numerous health and safety concerns. Insufficient cover and lack of fencing around the old lagoon posed a significant risk to passersby, and the inside of the old lagoon contained contaminated soil/sediment.

In 2005, a decommissioning project was initiated to restore the old lagoon to its natural vegetative state, minimizing health and safety concerns and fulfilling obligations to the water license. The project entailed remediation of the soil/sediment followed by filling

and compacting with gravel. The project was complete in the spring of 2008, resulting in improvement of water/land quality and restoration of the area.

2.2 Coral Harbour Sewage Lagoon/Wetland

The Coral Harbour Sewage Lagoon/Wetland treatment project was identified for GTF funding in May 2005. The scope of this project involved modifications to the surrounding natural tundra wetlands to address issues with leaking in the existing sewage lagoon. Table 4 provides several parameters of effluent quality from the wetland, measured pre- and post-construction. A discernable improvement is seen in levels of biochemical oxygen demand (BOD), indicating an enhancement in the quality of effluent produced. Additionally, a drastic decrease in the total suspended solids (TSS) and number of fecal coliforms demonstrates that the wastewater is being effectively treated, resulting in the release of cleaner water into the surrounding environment.

Table 4. Measured parameters of effluent quality from the Coral Harbour Sewage lagoon/wetland

Project Title: Coral Harbour Sewage Lagoon		
Effluent Quality	**Prior to Construction***	**After Construction**
BOD [mg/L]	120	<6
TSS [mg/L]	100	<5
Fecal Coliforms CFU/ dL	>110,000	930
Oils and Grease (mg/L)	21	<1
pH	7.4	8
*Pre-construction values were measured at the discharge from the leak location		

2.3 Arctic Bay Power Supply

Prior to renovations of the water truck fill station in Arctic Bay, the building was powered entirely using a diesel generator. In 2008, over 35,000 L of diesel fuel was consumed for the daily operation of the station. Not only did the use of a diesel generator contribute to high operation and maintenance costs, but the burning of diesel fuel released GHG emissions to the environment. To minimize these impacts, power lines were run to the truck fill station to connect to the local power grid providing the community with reliable, cost efficient and cleaner energy to operate the station. The diesel generators will be kept onsite as a backup system to allow operation in the event of power outages.

In light of rising fuel costs, switching to the power grid is estimated to reduce the communities' operation and maintenance costs by 50%. More importantly, decommissioning the inefficient diesel generator significantly reduces the GHG emissions entering the environment, providing cleaner air for the community.

2.4 Kimmirut Power Supply

The scope of the Kimmirut Power Supply project was similar to the one initiated in Arctic Bay. The truck fill station in Kimmirut was powered entirely by a diesel generator. Approximately 33,500 L of diesel fuel was consumed in 2008 at a substantial cost to the community, both financially and environmentally. Connecting to the local power grid is estimated to save the community over 50% annually in operation and maintenance costs and provide cleaner air for the entire community. The generator will continue to be kept onsite as a backup power supply in the event of power outages.

2.5 City of Iqaluit: Sewage Lift Station

In summer 2005, construction began to upgrade sewage lift station #1 in the City of Iqaluit. At that time, the station was operating with 30 year old pumps that worked by air switches. With little internal control, these pumps would operate at 100% capacity regardless of the demand. Upgrades in 2005 replaced the old pumps with new Variable Frequency Drives (VFD). Currently, there are two VFD pumps operating at 50% capacity at the station, producing a reduced demand on resources, lowering operation costs, and allowing future growth within the municipality.

Figure 2: City of Iqaluit, Lift Station #1

Further upgrades to the facility included the installation of backup and safety systems, mainly as preventative measures to ensure environmental spills and clogged systems were minimized. A new backup generator and alarm system were installed to ensure the lift station would remain online during a power shortage and also to allow problems with the lift station to be detected promptly, minimizing the risk of potential spills. A new macerator was installed to break down foreign matter entering the sewer system, helping prevent the underground sewer lines, pumps and equipment at the wastewater treatment plant from becoming clogged.

Prior to the upgrades, four spills were recorded at the lift station, mainly the result of power failures. Since completion of the upgrades, only one spill has been recorded, and this spill only resulted due to severe weather when maintenance personnel could not attend to the station. These upgrades have significantly improved water service to the community and have minimized spills to the surrounding environment.

2.6 City of Iqaluit: Sludge Management Project

In 2006, The City of Iqaluit initiated a study to develop and implement technologies to address sludge management. A freeze/thaw, dewatering and composting project was developed and employed as a new sludge management/treatment process. Under the plan, a freeze/thaw technique was used to dewater the raw sewage sludge producing a much dryer sludge material that could be mixed with wood chips, piled in rows, and allowed to decompose into compost over the summer and winter months. The goal of the project was to effectively treat sludge before disposal, ensuring minimal risk to public health and the receiving environment.

Sludge samples were tested at the start of the treatment process in 2006, and compost samples were tested at the end of the treatment process in 2008. Measured parameters of sludge and compost quality are shown in Table 5.

Table 5. Comparison of measured compost and sludge quality parameters before and after implementation of the treatment process.

Parameter	Unit	Compost (2008)	Sludge (2006)
Water	%	32.1	80.2
Solids	%	67.4	17.6
Oil (dry wt.)	%	0.68	11
Oil (wet wt.)	%	0.46	2.16
Total Coliforms	MPN/g	<3	>1,100,000
Fecal Coliforms	MPN/g	<3	>1,100,000
Solids (wet wt.)/Total Solids	%	55.7	19.5
Soil pH		7.4	5.6
BOD (extractable)	mg/kg	3400	39500

*MPN = Most Probable Number

Tests indicate that the treated compost material had drastically reduced levels of total and fecal coliforms, as well as reduced levels of extractable BOD. These levels fall within US EPA sewage sludge use and disposal standards and are suitable for use as a cover material for the landfill. By using the treated compost instead of conventional granular material for landfill cover, it is estimated that the City of Iqaluit will save over $40 per cubic meter in landfill maintenance. Supplementary to the cost savings, the sludge program has directly led to the implementation of technologies to improve solid waste management within the community and provide a cleaner living environment for residents.

3. Outcomes Report: Public Transit Funds

3.1 Runway Stabilization Projects

Airports in many communities in Nunavut employ gravel runway surfaces. These surfaces are often in close proximity to the communities they serve and typically produce a considerable amount of air-borne particulates (dust) during aircraft landing and takeoff. This is especially evident in the drier summer months where no snow cover is present.

In May 2008, identical runway stabilization projects were initiated in four (4) communities in Nunavut – Pond Inlet, Repulse Bay, Cambridge Bay and Kimmirut. Each project entailed the application of dust suppressant/aggregate stabilizer material on the gravel runway surfaces. With the exception of Cambridge Bay, where there was a delay in the delivery of materials and supplies, the projects in the remaining communities were completed by the end of August 2009.

The application of runway stabilization material substantially improved air quality in these communities, reducing the amount of atmospheric particulates (dust) produced during airplane movements. Additionally, the treatment of the runway surfaces prolongs the useful life cycle of the runways, reducing the need for further maintenance in the future.

4. Conclusions

The infrastructure found in the majority of communities in Nunavut are beyond their useful lifecycle and many are inefficient, expensive to operate, and potentially hazardous to the community and the environment. These deficiencies are particularly evident in critical components such as water, wastewater, and solid waste infrastructure, where renovations/repairs are desperately needed to keep pace with expanding communities.

GTF and PTF have provided reliable, multi-year Federal funding to target the aging infrastructure in Nunavut. These funds have been implemented by the GN specifically towards environmentally sustainable projects, with the goal of achieving cleaner communities through improvements in drinking water, efficient wastewater treatment, and reliable solid waste disposal.

With the extension of the Federal Gas Tax program, communities in Nunavut will receive an additional $60 M of funding over the next four fiscal years (2010 – 2014). These funds will continue to be used to meet the GN's mandate of providing environmentally sustainable infrastructure for all communities – ensuring reliable services for the health and safety of all citizens in Nunavut.

The outcome of completed projects to date shows the GN's commitment to enhance the shared national outcomes of cleaner air, cleaner water and reduced GHG emissions throughout the Territory. With over 30 water, wastewater, and solid waste projects initiated as of September 2009, GTF and PTF have provided Nunavut with the opportunity to improve critical infrastructure, ensuring future sustainable growth in its communities.